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AUTHOR	Dey, Eric L.; Wimsatt, Leslie A.; Rhee, Byung-Shik; Meader, Ellen Waterson.
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ABSTRACT

This study examined whether, and to what extent, college quality has a longitudinal impact on the occupational status of students after controlling for students' background characteristics, ability, and years of schooling. The study also explored whether college quality differentially affects the long-term occupational status of students. Data for the study came from the Wisconsin Longitudinal Study of 1957 and represented a sample of Wisconsin high school seniors who had graduated during the 1957 school year, had attended college and earned a postsecondary degree, and who were employed at the time of the survey. Survey data were collected from respondents or parents in 1957, 1964, 1975, and 1992, and from selected siblings in 1977 and 1993. The data provide a full record of social background, youthful aspirations, schooling, and labor market experience. Data from earlier years were supplemented by mental ability tests, measures of school performance, and information regarding school and college contexts, employers, and industries. Data analysis indicated that college quality did not appear to substantially influence students' long-term occupational success. The strongest influence was level of educational attainment. Higher levels of educational attainment led to increased occupational status. A table of college majors coded by major constructs is appended. (Contains approximately 115 references.) (SM)

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ERIC L. DEY

LESLIE A. WIMSATT

BYUNG-SHIK RHEE

ELLEN WATERSON MEADER

National Center for Postsecondary Improvement
Stanford University
School of Education
520 Galvez Mall, 508 CERAS
Stanford, CA 94305-3084

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Introduction

One of higher education's basic assumptions is that college quality has profound and lasting consequences for students, and evidence of this assumption can be seen in the activities undertaken by the many constituencies concerned with higher and postsecondary education. Students (and often their parents as well) invest a great deal of time, energy, and financial resources in order to gain admission to colleges and universities believed to offer the highest quality education. College faculty and administrators are also concerned with quality at a number of levels, as their professional futures are directly tied to their ability to improve institutional and programmatic quality. Quality is also the ubiquitous concern of federal, state, and institutional policymakers, who seek to develop methods in order to both assure minimal standards while also attempting to improve the quality of institutions under their purview.

Although the idea that college quality produces long-lasting effects in the lives of students is deeply embedded in our thinking about higher education, the existing research in this area is not voluminous. Researchers have tended to focus their efforts on studying student outcomes in a relatively short time span (usually at the point of institutional departure or a few years after), as opposed to over the life course (Pascarella and Terenzini, 1991). In addition, stubborn questions remain about the most appropriate ways of measuring college quality. Although the "resource and reputation" approach remains quite common, this is being critiqued with increasing frequency and alternative approaches have been suggested (Astin, 1985; Smith and Fiedler, 1971; Liu, 1978; Tan, 1992).

The purpose of this study is to examine whether, and to what extent, college quality has a longitudinal impact on the occupational status of students after controlling for students' background characteristics, ability, and years of schooling. We also explore whether college quality differentially affects the long-term occupational status of students when measured at two different points in time following high school completion. Although a number of outcomes could productively be considered, we have concentrated on occupational status given that this is a fairly well developed area of research, and that it is a topic that has been—and continues to be a concern—of the higher education community. Using data that spans more than three decades, this study intends to stimulate additional interest in examining the long-term outcomes of college attendance. While many of the important issues related to this topic will necessarily be unresolved by this analysis, it is our goal to add to the discussion of this important topic.

Models of Socioeconomic Attainment

The most influential models of the socioeconomic attainment process assign formal education a central role in determining occupational status (Alwin, 1974; Pascarella and Terenzini, 1991; Sewell and Hauser, 1975; Trusheim and Crouse, 1981). Students and parents perceive that individuals who attend colleges and universities are conferred distinctive advantages in terms of economic and career advancement based on institutional quality (Knox, Lindsay, and Kolb, 1988, 1993; Mortimer, Lorence, and Kumka, 1986; Rynes and Boudreau, 1986). Hence, the influence of college quality on occupational outcomes remains an area of substantial research interest (Knox, Lindsay, and Kolb, 1988, 1993; Pascarella and Terenzini, 1991).

Although various theoretical models attempt to conceptualize how formal education—and higher education in particular—contributes to an individual's socioeconomic achievements, two such conceptualizations (socialization and status conferral) prevail in the field of socioeconomic attainment (Knox, Lindsay, and Kolb, 1993). The former posits that formal education enhances personal productivity or development that in turn leads to increased occupational status. It asserts that graduates of "better" colleges attain greater occupational success because those colleges provide a more rigorous or better education (Pascarella and Terenzini, 1991). In contrast, the latter emphasizes the power of education as an institution to assign students to new and legitimate status identities. It hypothesizes that holding a degree from an elite college identifies a person as talented and capable of high-level performance (Spence, 1973; Karabel and McClelland, 1983; Klitgaard, 1985). Despite different explanations about the role of formal education, these conceptualizations have much in common, in that they eventually agree with the importance of college education.

A large number of empirical studies show that certain measures of college quality, such as academic selectivity or prestige, modestly but consistently enhance educational and early occupational attainments (Astin, 1975; Ethington and Smart, 1986; James, Alsalam, Conaty and To, 1989; McClelland, 1990; Rosenbaum, 1984; Rumberger and Thomas, 1993; Smart, 1988; Solmon, 1975, 1981; Trusheim and Crouse, 1981; Useem and Karabel, 1986). The primary focus of previous studies can be classified into three categories: the economic return of college education, the effect of college education on wage or salary after graduation, and the effect of college education on short-term socioeconomic status (e.g., Daniel, Black, and Smith, 1996a, 1996b; Pascarella, Smart, and Smylie, 1992; Perrucci, 1980; Sharp and Weidman, 1987; Spaeth and Greeley, 1970).

Previous Research: College Quality

A review of the research literature reveals that two general approaches have been taken to infer college quality. Some studies of occupational status attainment have used institutional selectivity or prestige as a measure of college quality while others have examined the effect of institutional resources.

Selectivity (Prestige)

The weight of existing evidence suggests that certain college quality measures, such as academic selectivity or prestige, modestly but consistently enhance occupational status, educational attainment, career mobility, and earnings (e.g., Astin, 1975; Ethington and Smart, 1986; James, Alsalam, Conaty, and To, 1989; McClelland, 1990; Mueller, 1988; Rosenbaum, 1984; Rumberger and Thomas, 1991; Smart, 1988; Solmon, 1973, 1975, 1981; Trusheim and Crouse, 1981; Useem and Karabel, 1986). For example, Alwin (1974) used the WLS 1957 base year and 1964 follow-up survey data to estimate the effects of college on the occupational status of 1,198 men seven years after high school graduation. Institutional prestige was measured using Astin Estimated Selectivity Scores along with other traditional resource measures of college quality. Using multiple regression analyses, Alwin found that institutional size and prestige were superior in accounting for variance in occupational status.

In later research, Useem and Karabel (1986) studied managerial careers within 208 large corporations and, controlling for social origins and post-baccalaureate training, found that graduating from an elite institution was predictive of occupational status attainment. In this study, all of the corporate managerial positions examined required a college degree for employment. It was concluded that in situations where similar credentials are required for employment, where one attends college might be the most salient factor with regard to occupational status attainment.

Studies employing the National Opinion Research Center 1968 follow-up of 1961 college graduates (Spaeth and Greeley, 1970; Perrucci, 1980) and the 1979 follow-up of the NLS-72 sample (Sharp and Weidman, 1987) also reported statistically significant and positive effects of college selectivity on subsequent job prestige. Similar results are reported by Knox, Lindsay, and Kolb (1988, 1993), who used the 1986 follow-up of the NLS-72 data, and Karabel and McClelland (1987), who used a national sample of men who were twenty to sixty-four years old in 1973. In most cases, however, the standardized regression coefficient estimating the net influence of college selectivity on occupational status was quite small (less than .11 in magnitude for most analyses). The study with the largest effect (Karabel and McClelland, 1987) failed to control for individual ability or occupational aspirations.

Tinto (1980, 1981) analyzed the 1968 follow-up of a national sample of white males who graduated from college in 1961 and who were broadly dichotomized into professional and business/managerial careers. He hypothesized that nontrivial differences exist in the degree to which college quality influences the process of status attainment in various occupations, because professional occupations are characterized by the centrality of intellectual skills and knowledge requirements that are typically acquired in formal educational settings such as college or graduate school. Although Tinto controlled for background characteristics and college selectivity, he did not control for precollege occupational aspirations, intellectual ability, or educational attainment. The findings of this study suggest that the impact of institutional selectivity on occupational status attainment varies by career.

Smart's (1986) research on occupational status attainment used data from the 1971 and 1980 Cooperative Institutional Research Program (CIRP) surveys to derive a final analysis sample of college graduates. This sample was based on attendance at a single undergraduate institution and full-time employment status in 1980. Smart pooled the results for men and women by coding gender as a dummy variable. He performed separate analyses for those in professional (2,069 individuals) and non-professional (1,380 individuals) occupations in response to Tinto's (1980) concern regarding a segmented labor market. After controlling for precollege occupational aspirations, race, and secondary school achievement as well as for family socioeconomic status, he found that undergraduate college selectivity had no statistically significant direct influence on early occupational status (Duncan Socioeconomic Index [SEI]) in either professional or managerial careers nine years after college enrollment. For professional careers, however, college selectivity did exert a statistically significant positive indirect effect on occupational prestige through its strong impact on educational attainment.

The Smart (1986) and Tinto (1980, 1981) studies are at least indirectly reinforced by evidence which indicates that attending a selective or prestigious undergraduate institution modestly enhances academic success in professional schools such as law and medicine (e.g., Clapp and Reid, 1976; Evans, Jones, Wortman, and Jackson, 1975; Pugh, 1969) and the successful implementation of careers in education (Long, Allison, and McGinnis, 1979), engineering and scientific research (Astin, 1977) and medicine (Pascarella, Brier, Smart, and Herzog, 1987). However, college selectivity was also directly predictive of early career status for women in a study conducted by Braxton, Brier, Herzog, and Pascarella (1990) which examined data from the 1971 and 1980 CIRP surveys and HEGIS institutional data files to determine the influence of student entry characteristics, college characteristics, and academic/college experiences on the probability of entering a high status legal profession.

Institutional Resources

Some studies of occupational status attainment have used institutional resources as a measure of college quality, but such measures are more commonly examined in research on wages and earnings where quality of faculty (e.g., proportion holding doctoral degrees) and fiscal resources (e.g., library expenditures) have often been used as proxies for quality of education (Cohn and Geske, 1990; Daniere and Mechling, 1970; Psacharopoulos, 1987; Weisbrod and Karpoff, 1968). Within the higher education literature, several recent studies provide integrated frameworks for investigating the effects of college quality on occupational status attainment. This research considers measures of both institutional resources *and* selectivity in order to determine the influence of college quality on student outcomes (e.g., earnings).[1]

Historically, researchers have cautioned that resource measures are often highly intercorrelated (James et al, 1989; Morgan and Duncan, 1979; Solmon, 1975). Recently, this collinearity was exploited by Daniel, Black, and Smith (1996a, 1996b) who constructed several college quality indices to measure the effect of college quality on early career attainments. In their initial study (1996a), they conducted research on a group of 3,100 men using ten variables (tuition, spending per student, faculty/student ratio, enrollment, rejection rate, retention rate, graduation rate, high school ranking of students, number of faculty with Ph.D.s, and average SAT scores/percentiles).

In a subsequent study of 3,000 women (Daniel, Black, and Smith, 1996b), they examined the effect of six college quality variables to measure career attainments (spending per student, faculty/student ratio, rejection rate, average SAT scores, high school ranking of students). Both studies used data from three sources to estimate quality effects from wage regressions: 1) the National Survey of Youth (NLSY), a panel data set based on annual surveys of individuals 14-21 years old; 2) the Integrated Postsecondary Education Data System (IPEDS) for 1990; and 3) *U.S. News and World Report's* Directory of Colleges and Universities (1991). Of the five subsamples that comprise the NLSY, only the representative cross-section and the minority oversamples were used. Regression analyses controlled for factors such as previous labor market experiences, family and other background characteristics, high school quality, and industry of employment.

Daniel, Black, and Smith (1996a) found that, for both men and women, attendance at a higher quality college increased wages, although the evidence was less robust for women. For women, they found that institutional control (private versus public) predicted subsequent wage levels.

Related Literature

In addition to college quality, three general categories of past research have been shown to affect occupational status attainment and are important to take into account: 1) *inputs* such as student background characteristics; 2) *college measures*, including institutional characteristics and choice of college majors; and 3) *educational attainments*.

Inputs

Unraveling the effects of student background characteristics such as gender, family socioeconomic status, academic/intellectual ability, secondary school achievement, and occupational aspirations on subsequent occupational success is difficult. Therefore, some college quality studies have controlled for these variables when examining occupational status.

With regard to gender, some studies have found that college-educated women actually begin their work lives in higher-status jobs than men do, but then lose this advantage by mid-life (Sewell, Hauser, and Wolf, 1980). Sewell, Hauser, and Wolf (1980) used data from the Wisconsin Longitudinal Study (WLS) and 1975 follow-up surveys to examine high school graduates' occupational status seventeen years after high school completion. Using the Duncan SEI as a measure of occupational status, they were able to determine that status attainment for a first job averaged ten points higher for women than for men. Interestingly, these effects were not evident when occupational status was subsequently examined using the 1974-75 employment data.

Pascarella and Terenzini (1991) suggest that family socioeconomic factors such as the educational attainment of parents influence key intervening steps in the status attainment process (e.g., family income, aspirations, educational attainment), all of which can have an important impact on eventual occupational status. Research findings in this area have been somewhat inconsistent. A study by Jencks et al (1979) concluded that occupational status varies according to both family socioeconomic standing and academic/intellectual abilities. However, Alexander and Eckland (1975) did not find these factors to be predictive.

Substantial evidence does support the claim that occupational aspirations at the beginning of college strongly predict senior year career choice and career entry following college (Astin, 1977; Astin and Myint, 1971; Braxton, Brier, Herzog, and Pascarella, 1990; Ethington, Smart, and Pascarella, 1987; Pascarella, Brier, Smart, and Herzog, 1987; Tusin and Pascarella, 1985). Braxton, Brier, Herzog, and Pascarella (1990) used data from the 1971 and 1980 Cooperative Institutional Research Program (CIRP) and examined a sample of 4,784 undergraduate men and women to estimate the effects of several student

entry characteristics, college characteristics, and college experiences on occupational outcomes. The final analysis sample included only students who were first-time, full-time freshmen at four-year institutions in 1971 and who attended a single institution as undergraduates. Student data was merged with institutional information from the Higher Education General Information Survey (HEGIS) to conduct the analysis. With the exception of precollege aspirations, results showed that few entry characteristics directly influenced the early occupational status attainments of these students. Although precollege aspirations were predictive in this study, it is well recognized that students often change their occupational plans during college (Astin, 1977; Astin and Paos, 1969; Davis, 1965; Feldman and Newcomb, 1969; Fenske and Scott, 1973; Hind and Wirth, 1969; Theophilides, Terenzini, and Lorang, 1984). Thus, an investigation of the long-term impact of career aspirations on occupational status attainment is warranted.

College Measures

Another research area has examined how institutional characteristics (e.g., institutional control, institutional size, highest degree offered) and educational experiences (college major) affect the occupational status outcomes of graduates. Extant research supports the general conclusion that when precollege student background characteristics are controlled, features of institutions attended by college students and their academic activities within those institutions often have only a slight impact on subsequent attainment measures (Alwin, 1974; Jencks, 1972; Sewell and Hauser, 1975; Treiman and Terrell, 1975; Trusheim and Crouse, 1981).

Knox, Lindsay, and Kolb (1988, 1993) analyzed data from the 1986 follow-up to the National Longitudinal Study of the High School Class of 1972 (NLS) to determine the long-term effects of attending college on occupational status. Net of such salient characteristics as size and selectivity, these researchers found that attending a private institution significantly enhanced occupational status (as measured by the Duncan SEI). In examining the effects of size on occupational status, Knox, Lindsay and Kolb again controlled for precollege traits (e.g., socioeconomic status, academic/intellectual ability, occupational aspirations), institutional characteristics (e.g., private/public control), and college quality (prestige/selectivity). Institutional size was shown to have a statistically significant but small positive effect on the occupational status of the 2,702 men and women included in this analysis.

Sharp and Weidman (1987) analyzed the same general data as Knox, Lindsay, and Kolb, but selected the 1979 NLS survey follow-up to examine individuals nine years after entering college as freshmen. They also confined their analysis to B.A. recipients from the following academic fields: humanities, social sciences, business, and education. Controlling for essentially the same precollege and institutional characteristics as Knox,

Lindsay, and Kolb, Sharp and Weidman found that attending a private institution actually had a statistically significant negative influence on the early occupational status of men. However, the corresponding effect for women was not statistically significant.

Using the 1971 and 1980 Cooperative Institutional Research Program (CIRP) survey data, Smart (1986) studied the effects of family socioeconomic status and educational attainment on occupational status attainment. He selected a sample of individuals who had attended a single undergraduate institution and who were employed full-time in 1980. These restrictions yielded a final sample of 3,449 respondents with complete information on all of the variable constructs included in the analyses: precollege characteristics, undergraduate institutional characteristics, college achievement and experiences, educational attainment level, first job, and current job. Smart also controlled for essentially the same individual and institutional characteristics as Knox, Lindsay, and Kolb (1988, 1993), but found that attending a private college or university primarily enhanced the occupational status of individuals entering business or managerial careers. While his analysis yielded generally similar results at each point in time for those in business/managerial fields, the results did not hold for those employed in fields defined by the U.S. Bureau of the Census as "professional." Also, after controlling for precollege traits such as socioeconomic status, occupational aspirations, academic ability and institutional characteristics such as selectivity, and private/public control, Smart found that institutional size had a statistically significant but small positive effect on occupational status attainment.

It is also interesting to consider the findings of Astin and Panos (1969) and Astin (1977) who examined successive iterations of a national sample of college students drawn from the Cooperative Institutional Research Program (CIRP) to determine the effects of institutional characteristics on college student behaviors. From these studies, several discoveries were made regarding the effect of institutional characteristics on occupational status selection. Astin (1977) found that while attendance at public four-year institutions significantly enhanced the likelihood of students becoming college teachers or engineers, it reduced the likelihood that they would enter careers in business, law, medicine, or nursing. Astin and Panos (1969) controlled for a large battery of student precollege characteristics and college prestige measures, but found no statistically significant net link between institutional size and students' choice of relatively high status careers in law, medicine, engineering, or the ministry.

Kamens (1971) analyzed data on students from 99 institutions who were followed from their freshman through junior years of college. Contrary to Astin and Panos (1969), Kamens found that students who attended large colleges were significantly more likely than students who attended small colleges to choose careers higher in occupational status (e.g., law, medicine, engineering). His analysis statistically controlled for freshman

occupational choice, gender, academic ability, and a measure of the "prestige" of the institution attended. In a subsequent analysis of a national sample of college students, Kamens (1979) discovered that the presence of a graduate or professional degree program at an institution affected occupational choices made by students.

Although the research results are mixed, size appears to be the most consistently predictive institutional characteristic. Meyer (1970) and Kamens (1971) have reasoned that larger institutions, by virtue of the greater number of majors and pre-professional programs offered, typically have a wider range of links with occupational and economic groups in society.

The relationship between undergraduate college experiences (e.g., experiences within the academic major) and occupational status attainment has been the focus of several research studies. Pascarella and Terenzini (1991) have hypothesized that it is likely that elite institutions enroll students with high occupational status aspirations in comparison with other types of institutions and that, for students attending selective or prestigious institutions, the undergraduate experience is used more to implement than to choose a career.

While it has long been recognized that the earnings of college graduates are affected substantially by the choice of a college major (Berger, 1988; James et al, 1989; Rumberger, 1984), evidence concerning the influence of academic major on occupational status is fraught with inconsistencies. Thomas and Gordon (1983) analyzed the 1979 follow-up of the NLS-72 data. After controlling for gender, race, socioeconomic status, academic ability, educational and occupational aspirations, college grades, and educational attainment, majoring in natural science and technical fields (compared with such majors as education and social sciences) had a statistically significant positive direct effect on occupational status (as measured by the Duncan SEI) for women but not for men. This finding was generally replicated in another sample by Harvey and Kalwa (1983) and similar results were reported for women by Stoecker, Pascarella, and Wolfle (1988). Smart (1986) found that majoring in the natural sciences had a statistically significant negative influence on early occupational status for both professional and non-professional careers.

Angle, Steiber, and Wissman (1980) investigated the early status attainment of a national sample of men and women who worked full-time. Controlling for age, sex, race, a measure of family socioeconomic status, and educational attainment, these investigators found that college academic major increased the explained variance in occupational status less than one percent. Business majors had jobs with the highest status score (Duncan SEI), followed by majors in education, social sciences, and the humanities. Jobs with the lowest prestige were held by natural science majors and those majoring in fields not included in the other categories.

Sharp and Weidman (1987) examined data from the 1979 follow-up of the NLS-72 study. Their research revealed that majoring in business, education, or the humanities (versus the social sciences) had positive effects on the job status of women, while men's job status was positively affected by majoring in business, education, or the social sciences (versus the humanities). Unfortunately, no controls appear to have been made for important precollege variables such as occupational aspirations, academic achievement, and ability.

Wilson and Smith-Lovin (1983) used a multidimensional scaling of majors based on the extent to which they were "targeted" toward prestige, authority (extent of supervision over others), or income and analyzed data from the 1968 follow-up of a national sample of 1961 college graduates. Majors were scaled using a two-step process: 1) prestige levels were projected based on existing information about the national occupational status structure (e.g., U.S. census data); and 2) a state employment security commission assisted with matching ninety-seven college majors with likely employment outcomes. This provided occupationally linked distinctions among majors within broad categories. Subsequently, each of the three dimensions of academic major were shown to have statistically significant net direct effects on occupational status, as measured by the Duncan SEI.

Several researchers (e.g., Solmon, 1981) have also noted that certain fields of study (e.g., business, engineering, technical, or professional) tend to have a closer fit with the skills required in one's first job than do others (e.g., arts, humanities, social sciences). As an individual's career progresses, specific skills learned in a major field of study appear to decline in importance and to be replaced by more general intellectual skills and ability to learn on the job (Pascarella and Terenzini, 1991).

Educational Attainment

An extensive body of evidence indicates that even when individual background characteristics and abilities are held constant, level of formal education has a strong positive impact on occupational status throughout the life span. Moreover, the clear weight of this evidence suggests that among all measurable influences (family status, ability, aspirations, significant others), education is the strongest predictor (Alexander and Eckland, 1975; Alexander, Eckland, and Griffin, 1975; Duncan, 1968; Featherman and Carter, 1976; Fligstein and Wolf, 1978; Griffin and Kalleberg, 1981; Jencks, Crouse, and Mueser, 1983; McClendon, 1976; Porter, 1974, 1976; Sewell, Hauser, and Ohlendorf, 1970; Sewell, Haller, and Portes, 1969; Sewell and Hauser, 1975, 1980; Treiman and Terrell, 1975). Further, earning a bachelor's degree may count for more in terms of job status than where one earns it (Pascarella and Terenzini, 1991).

Jencks et al (1979) analyzed data from five national and six special-purpose samples of men twenty-five to sixty-four years old to identify the factors that influenced occupational

status. Their sample included both college-goers and non-college goers. They found that the effect of educational attainment on occupational status was strongest for those individuals in early career stages and that the relationship between educational attainment and occupational status was nonlinear—the bachelor's degree yielded the largest rate of return (Jencks et al, 1979). After controlling for background characteristics such as ability/intellectual levels and family socioeconomic status, they discovered that occupational status was 34 percentile points higher for men with a bachelor's degree as opposed to those with less than a bachelor's degree. This equates to approximately five Duncan SEI points over and above the composite SEI increase that one would obtain for four years of college without completing a degree. Interestingly, educational attainment was most predictive of *early* occupational status attainment.

After controlling for race, gender, family socioeconomic status, and academic ability, Knox, Lindsay, and Kolb (1993) found that obtaining an advanced degree returns occupational status advantages beyond the bachelor's degree that are about two-thirds of what a bachelor's degree returns in comparison with a high school diploma. However, some differential effects may have been masked in this study because all advanced degrees were pooled into a single category (Pascarella and Terenzini, 1991). Other researchers (e.g., Harvey and Kalwa, 1983; Spaeth, 1977) have explored the relationship between graduate education and occupational status and found that men experience higher early occupational returns than women. Not all research evidence supports this finding. For example, Wilson and Smith-Lovin (1983) have shown that the occupational returns on graduate education are about the same for each gender.

Summary

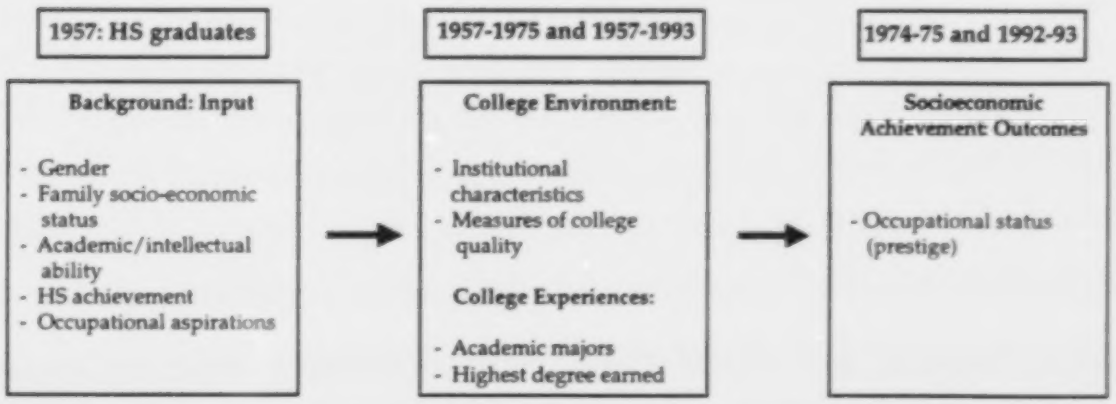
The existing research literature has successfully demonstrated that college quality has some influence on occupational status attainment, yet it suffers from several limitations. First, the majority of research regarding the effect of college quality has focused on early career success as an outcome of college quality rather than on how institutional quality factors influence occupational status attainments over an extended time period following high school graduation (e.g., Angle, Steiber, and Wissman, 1980; Solmon, 1981; Thomas and Gordon, 1983). Second, many studies have been hampered due to use of only a single measure of institutional quality (e.g., Karabel and McClelland, 1987; Mueller, 1988). Third, much of this literature focuses on males, thus ignoring important gender differences in the impact of college quality (e.g., Daniel, Black, and Smith, 1995a; James et al, 1989; Karabel and McClelland, 1987; Wachtel, 1976). Finally, most of the existing literature uses very limited models to estimate the effects of college quality by only focusing on elite institutions, or by failing to control for career-salient background characteristics of students (e.g., Kingston and Lewis, 1990; Sharp and Weidman, 1987).

The present study attempts to address each of these limitations. First, we use longitudinal survey data to study individuals seventeen and thirty-five years after high school graduation. Second, college quality is measured using both traditional institutional resource measures and academic selectivity (prestige) to determine their effect on occupational status. Third, it examines both men and women in the analyses. Fourth, it uses a robust model that includes background characteristics, institutional characteristics, college major, degree attainment, and previous occupational status attainment to predict occupational status. Specifically, the study addresses the following research questions: 1) whether college quality affects the occupational status of graduates after controlling for background characteristics, ability, and years of schooling; and 2) to what extent college quality influences long-term occupational outcomes.

Research Framework and Hypotheses

Figure 1 provides an overview of the concepts and variables used in our analyses to estimate the influence of college quality based on institutional resources and academic selectivity on socioeconomic attainments. In addition to measures of college quality, the model also includes measures of student background characteristics, characteristics of the college attended, college major, and measures of educational and occupational attainments. It is important to recognize that each of the variables within this framework can either help to increase the level of occupational status, or can reduce or mitigate against such attainment. The combined effects may influence the extent to which college students increase their occupational status over time.

Figure 1. Research Framework: Determinants of Occupational Status



Research Framework for College Effects on Occupational Status: A Longitudinal Analysis

The model is longitudinal and is based on the assumption that attendance at an undergraduate institution is influenced by student background factors. In turn, it is anticipated that student background characteristics and characteristics of the undergraduate institution attended (including the quality of the institution) will influence students' college experiences (academic majors) and educational achievements (highest degrees earned). Finally, it is hypothesized that socioeconomic attainments (occupational status) will be influenced by all preceding variables in the conceptual model (Alwin, 1974; Blau and Duncan, 1967; Pascarella and Terenzini, 1991; Sewell and Hauser, 1975). While we acknowledge that the effect of college quality on occupational status attainment may be mediated by a variety of outcomes resulting from college attendance (e.g., cognitive and psychosocial development), examination of such factors falls beyond the scope of this study.

Methodology

Data and Sample

Data from the Wisconsin Longitudinal Study (WLS) of 1957 high school seniors were used for our research. The WLS data were selected from a one-third-probability sample of 10,317 seniors who graduated from Wisconsin high schools during the 1957 academic year. Survey data were collected from the original respondents or their parents in 1957, 1964, 1975, and 1992 and selected siblings in 1977 and 1993. These data provide a full record of social background, youthful aspirations, schooling, and labor market experiences. The survey data from earlier years have been supplemented by mental ability tests, measures of school performance, and information regarding school and college contexts, employers, and industries. This information comes from a variety of sources, including a 1957 high school administered questionnaire (see Little, 1958), high school records, Wisconsin State Testing service records, and follow-up questionnaire surveys (Sewell and Hauser, 1993).

Specifically, our final analysis sample consists of men and women who attended college, earned a postsecondary degree, and were employed at the time of the survey follow-up. This sample is primarily derived from two sources: 1) the 1974-75 WLS follow-up survey (1,754 individuals); and 2) the 1992-1993 WLS follow-up survey (1,900 individuals). However, we also used the WLS base year data to determine student background characteristics.

Variables

The dependent variable for this study is occupational status, a hierarchy of occupations that reflect perceived prestige or desirability as ranked by Siegel (NORC) Prestige Scores (Duncan, 1961; Hauser and Featherman, 1977; Pineo and Porter, 1967; Siegel, 1971). Occupational status provides a useful estimate of the relative social standing of the respondents' most recent jobs in comparison with the rankings of other jobs. Hence, we can estimate the extent to which occupational standing can be attributed to higher education (Knox, Lindsay, and Kolb, 1988, 1993).

The Siegel (NORC) Prestige Scores are based on subjective rankings to establish the standing of a large number of occupations (Miller, 1991)[2] and were selected to measure occupational status in our study for several reasons: 1) although socioeconomic indicators such as the Duncan SEI and the Siegel (NORC) Prestige Scores reflect approximately equivalent prestige and socioeconomic status for most occupations, for a substantial number they do not (Miller, 1991); 2) the Siegel (NORC) Prestige Scores are particularly responsive to non-socioeconomic occupational dimensions such as education (Hauser and Featherman, 1977); 3) prestige as a major occupational reward is a relatively good indicator of occupational status attainment (Hauser and Featherman, 1977; Treiman, 1977); and 4) while socioeconomic factors are the main determinants of prestige, prestige is determined by other factors as well (Treiman, 1977).

The nineteen predictor variables for the multiple regression analyses were selected to assess constructs in the research framework. The independent variables in the regression model include background characteristics (gender, socioeconomic status, academic/intellectual ability, high school rank, occupational aspirations), institutional characteristics (control, highest degree offered, undergraduate enrollment, college quality measures), college major (engineering, business, education, health, science/math, social sciences, humanities), educational attainment (highest degree earned), and previous occupational status. College quality is measured using both traditional institutional resource measures (faculty compensation, number of faculty with Ph.D.s, library expenditures, and number of library volumes owned) and measures of academic selectivity or prestige. We created two composite measures of college quality to avoid multicollinearity of variables in the regression model. College majors were coded as a series of dummy variables. A residual category, which primarily consisted of vocationally oriented areas, constituted the dummy variable. The predictor variables were recoded as shown in Table 1.

Table 1. Definitions and Recodes of Predictor Variables

Background Characteristics	
1. Gender	Respondent's gender. Coded 0= male, 1= female.
2. Socioeconomic Status in 1957	Factor-weighted combination of parents' education, father's occupation and average parental income created from father's years of schooling, Duncan's Socioeconomic Index Score for father's 1957 occupation, and average parental income with estimates for missing data. Coded lowest to highest.
3. Academic/Intellectual Ability	Henmon-Nelson Test of Mental Ability Scoresin 11th grade.[3] Coded lowest to highest.
4. High School Rank	High school grades percentile rank. Calculated as 100 minus rank class/number of students x 100. Coded lowest to highest.
5. Occupational Aspiration	Respondent's intended occupational prestige (NORC Scores) in 1957 for the occupation the student hoped to eventually enter. Coded lowest to highest.
Institutional Characteristics	
6. Private Control	Controlling body. Coded 0= public, 1= private.
7. Highest Degree Offered	Highest degree level offered at institution. Coded 1= two-year school, 2= B.A. or first professional degree, 3= M.A. or second professional degree, 4= Ph.D. or equivalent.
8. Undergraduate Enrollment	Total undergraduate enrollment at institution. Coded lowest to highest.
9. Institutional Resources	Factor-weighted combination of average faculty salary, number of faculty with Ph.D.'s, number of library volumes, and library expenditures. Used as a measure of college quality. Coded lowest to highest (alpha = .95).
10. Institutional Prestige	Composite institutional variable comprised of the Astin Inteliectualism Score and Astin Selectivity Score. Astin Intellectualism standardized scores reflect percentage of students seeking Ph.D.'s, median high school grade point average, percentage with scientific occupational choices. Astin Selectivity standardized scores reflect the ratio of the number of high ability students who want to enroll to the total number of freshman admitted. Used as a measure of college quality. Coded lowest to highest (alpha = .86).

continued

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Table 1, continued

College Major[a]	
11. Engineering **12. Business** **13. Education** **14. Health** **15. Science/Math** **16. Social Science** **17. Humanities**	Major field of study or specialty at the college/ university where respondent earned a bachelor's degree or its equivalent. Coded 0= else, 1= college major (as listed).
Educational Attainment	
18. Highest Degree Earned	Level of highest degree earned since high school. Coded 1= associate, 2= bachelor's, 3= master's, 4= doctorate or professional degree.
Previous Occupational Status	
19. Occupational Status in 1974	NORC/Siegel Score for the longest job held in 1974. Coded lowest to highest.

[a]See Appendix, Table A for detailed information on the college major coding scheme.

Analyses

Demographic data (means and standard deviations) and separate multiple regression analyses were conducted for respondents by survey year (1974-75, 1992-93) in order to study the contribution of various background characteristics, institutional contexts, academic majors, educational attainments, and previous work experience upon the occupational status of respondents.

Due to the number of variables in the analyses, we selected OLS multiple regression analysis as our primary analytic method. Based on the research framework, we developed a regression equation model as follows:

Socioeconomic Status = f (gender, SES, HS achievement, mental ability, occupational aspirations, college quality, institutional context, college major, degree attainment)

All independent variables in the multiple regression analysis were mean-substituted and then force-entered in hierarchical blocks using the following sequence: background characteristics, institutional characteristics, academic majors, educational attainments, previous occupational status. Because gender, social class origins, and academic abilities affect where students go to college, what they study, and how long they stay in school, these relationships make it more difficult to isolate the effects of educational credentials, college characteristics, and student experiences. Therefore, we have controlled for the influence of these background factors in our analyses of college quality.

Limitations

Before considering the implications of these results, it is important to underscore the limitations of this study. First, we must recognize that occupational status represents but one of many possible outcomes of college that can be affected by institutional quality. College has a broad range of enduring outcomes, including changes in attitudes and values as well as cognitive, moral, and psychosocial growth and development. Also, although a variety of general cognitive skills develop during college, the effects of these competencies are not well understood (Berg, 1970; Jencks et al, 1979). It may be that attitudes, values, interpersonal/organizational skills, and levels of motivation or self-confidence have greater appeal to some employers than cognitive or technical skills in terms of potential for long-term occupational success and productivity (e.g., Becker, 1964; Collins, 1974; Hicks, Koller, and Tellett-Royce, 1984).

Second, this study was limited in terms of the diversity of the population available for our secondary data analyses. For example, the WLS data are restricted to a single cohort passing through postsecondary education at a similar point in time. Therefore, results may not be generalizable to more recent cohorts and to older populations of students. In addition, because only a small percentage of racial and ethnic minority groups were living in Wisconsin at the time of the original data collection, the WLS minority sample was too small to justify analysis (Sewell and Hauser, 1993).

Third, in terms of the coverage and quality of variables, the inclusion of additional control or occupation-relevant variables would have enriched our analyses. Although the available measures were more than adequate for our study, we would like to have had access to more detailed information regarding aspects of the college environment such as student achievements, faculty/student interaction patterns, and participation in

extra-curricular activities (e.g., Weidman, 1984). Further, the WLS base year survey asked a limited number of questions regarding occupational skills and training such as whether individuals were employed in occupations where a college degree was required, or in occupations that were significantly related to their college training.[4]

A final caveat with regard to coverage and quality of variables is that our analyses were limited by several missing cases in the WLS institutional characteristics subset (see discussion, Symonette, 1981, p.150). However, we were careful to select institutional variables that had the least amount of missing data for our analyses (e.g., institutional control, highest degree offered, undergraduate enrollment, number of library volumes, library expenditures).

We are aware that some scholars argue that it is misleading to assume that the process of occupational status attainment exists within an undifferentiated labor market (e.g., Kalleberg and Sorensen, 1979; Tinto, 1980, 1981). There may exist, in fact, a segmented labor market in which the salient factors that influence occupational status vary for different occupations or careers (e.g., Crane, 1969; Hargens, 1969; Perrucci and Perrucci, 1970; Tinto, 1981; Zuckerman, 1977) or in which labor markets may vary from community to community (Grubb, 1992). However, we feel that these concerns are outweighed since we know of no other data set that offers such a full record with which to explore the longitudinal effects of college quality on individual occupational status changes.

Finally, the broad groupings of academic majors used in this study (engineering, business, education, health, science/math, social sciences, humanities) may disguise important differences in occupational linkages that happen to fall within majors (see discussion, Pascarella and Terenzini, 1991). However, these traditional groupings provide a good measure of college experiences likely to have an impact on long-term occupational status and that can be relatively easily compared with previous research findings.

Results

Descriptive statistics were calculated for each of the variables included in this study and are listed in Table 2. Means and standard deviations for the independent variables illustrate that the majority of college-goers in our study were men who attended public universities (see Table 2). The size of the undergraduate population at these institutions appears to have varied widely, although average enrollment was slightly more than 6,000 students. While education majors represent the largest group of academic majors in our study, those in health-related fields constitute the smallest group. Finally, it is interesting to note that the average level of educational attainment was slightly more than that of a bachelor's degree.

Table 2. Means and Standard Deviations for Predictor Variables, Over Time[a]

	1974 (N=1754)		1992 (N=1900)	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Gender	.318	.466	.388	.488
Socioeconomic Status 1957	23.173	13.329	23.431	13.499
Ability Measure	71.580	23.027	72.143	22.677
High School Rank	69.764	23.255	71.089	22.705
Occupational Aspiration	77.456	7.652	77.378	7.328
Private Control	.379	.470	.381	.466
Highest Degree Offered	3.484	1.819	3.457	1.771
Undergraduate Enrollment	6221.559	5815.415	6159.501	5734.134
Institutional Resources	1.002	3.229	.899	3.156
Institutional Prestige	.116	1.579	.120	1.567
Engineering	.109	.312	.103	.304
Business	.105	.307	.095	.294
Education	.222	.416	.246	.431
Health	.049	.216	.058	.234
Science/Math	.125	.331	.119	.324
Social Science	.131	.337	.124	.330
Humanities	.139	.346	.140	.347
Highest Degree Earned	2.479	.680	2.442	.661
1974 Occupational Status[b]	558.169	115.762	558.700	105.099
1992 Occupational Status[c]			552.692	120.928

[a] Missing cases have been mean-substituted.

[b] 1970 Siegel prestige score for respondent's longest job held in 1974-75.

[c] 1970 Siegel prestige score for last or only job in fourth employer job spell, or last or only job in current/last job spell in 1992-93 - whichever is highest.

Tables 3 and 4 contain the results of the stepwise regression analyses with occupational status in 1974 and 1992 serving as the dependent variables. In order to show unusual effects outside of the last block of the model, regression results include statistics from each step of the regression equation. Standardized coefficients are provided to facilitate discussion.

Table 3. Predictors of 1974-75 Occupational Status Attainment (N=1754)

	β			
Variable	Block 1	Block 2	Block 3	Block 4
Gender	-.160****	-.158****	-.177****	-.056**
Socioeconomic Status in 1957	.013	.013	.019	-.000
Academic Ability	.031	.032	.037	.011
High School Rank	.074***	.074***	.051*	.002
Occupational Aspiration	.127****	.129****	.117****	.083****
Private Control		-.026	-.018	-.025
Highest Degree Offered		.018	.016	.017
Undergraduate Enrollment		-.079*	-.061	-.069
Institutional Resources		.033	.031	.019
Institutional Prestige		.033	.023	.013
Engineering			.055*	.100****
Business			-.040	.002
Education			.083**	.039
Health			.090****	.063**
Science/Math			.111****	.069**
Social Science			.040	.026
Humanities			.070**	.039
Highest Degree Earned				.377****
R^2 =	.06 (.056)	.06 (.058)	.08	.20

*p<.10, **p<.05, ***p<.01, ****p<.001

A slightly different set of variables were predictive of occupational status in 1974 than were predictive of occupational status in 1992, with student background characteristics such as gender and occupational aspirations playing a much greater role in 1974 status attainment. While academic ability had a significant effect on occupational status in 1992, a greater variety of college majors influenced occupational status in 1974. Degree attainment and prior occupational status by far accounted for the majority of the variance in both regression models. Overall, the regressions accounted for slightly less of the variance in the dependent variable for occupational status in 1974 (R^2 = .20) than for occupational status in 1992 (R^2 = .21).

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Table 4. Predictors of 1992-93 Occupational Status Attainment (N=1900)

	β				
Variable	Block 1	Block 2	Block 3	Block 4	Block 5
Gender	-.130****	-.125****	-.165****	-.037	-.028
Socioeconomic Status in 1957	-.019	-.028	-.025	-.031	-.031
Academic Ability	.072***	.069***	.076***	.052**	.048**
High School Rank	.036	.036	.013	-.034	-.034
Occupational Aspiration	.082****	.080****	.075***	.045*	.023
Private Control		.049	.060	-.051	.056
Highest Degree Offered		-.006	-.012	-.005	-.009
Undergraduate Enrollment		.001	.016	.002	.020
Institutional Resources		.015	.011	.002	-.002
Institutional Prestige		.002	-.007	-.015	-.019
Engineering			.045	.087***	.061**
Business			-.046	-.005	-.001
Education			.093***	.064***	.052
Health			.132****	.110	.089****
Science/Math			.087***	.060**	.042
Social Science			.019	.018	.017
Humanities			.054*	.030	.025
Highest Degree Earned				.317****	.213****
Occupational Status 1974					.295****
R^2 =	.04 (.036)	.04 (.038)	.06	.14	.21

*p<.10, **p<.05, ***p<.01, ****p<.001

There is some indication that students enrolled in larger institutions (as measured by undergraduate enrollment numbers) were less likely to achieve a higher level of occupational status in 1974 than students enrolled in smaller institutions, but this result does not hold after controlling for other confounding variables such as college major and educational attainments. Two key measures of college quality, institutional resources (average faculty salary, number of faculty with Ph.D.s, number of library volumes, and

library expenditures) and prestige (institutional selectivity) did not effect long-term gains in occupational status. In sum, institutional characteristics examined in this study generally exerted no appreciable direct effect on status attainment.

The findings also revealed that students' majors in college affected long-term occupational status attainments. While majoring in engineering and health positively predicted 1974 and 1992 occupational attainment levels, majoring in science/math affected only 1974 occupational attainments. It is interesting to note that before controlling for educational and occupational attainments, other college majors also entered the regressions: education and humanities (1974-75); education and science/math (1992-93).

Finally, it appears that degree attainment and work experiences following high school overrode most other factors in determining occupational status. However, it is interesting to note that 1974 occupational status attainment was predicted by four measures of background and institutional characteristics prior to the entry of college majors (gender, high school rank, occupational aspirations, undergraduate enrollment). And of these four, three background characteristics remained predictive until the last step of the regression. High school rank, education major, and humanities major were positive predictors in the third step of the equation, but not after educational attainment was added in the final step of the regression. A similar pattern held in our examination of 1992 occupational status levels. Background characteristics such as gender and occupational aspirations were initially predictive, but did not remain so through the fifth step of the regression.

In sum, college quality had no direct effect on occupational status as measured in this study. Rather, our findings suggest that the most significant factor influencing the occupational status (or prestige) of students was educational attainment. Controlling for students' academic achievement, socioeconomic status, and intellectual ability, students in this study who graduated from college with degrees in engineering and health tended to consistently hold more prestigious jobs. Students who graduated from college with degrees in science/math attained relatively high levels of occupational status seventeen years after high school graduation, but this effect was no longer evident when measured in terms of 1992-93 occupational status attainment (thirty-five years after high school graduation).

Discussion

The goal of this study was to examine whether, and to what extent, college quality has a considerable longitudinal impact on the occupational status of students after controlling for students' background characteristics and ability. This study extends previous research by examining the effects of college quality on occupational status attainments seventeen and thirty-five years after high school completion. The results indicate that while college quality does not appear to substantially influence students' long-term occupational success (e.g., Gruca and Pascarella, 1988; Karabel and McClelland, 1987), the strongest influence is simply their level of educational attainment. For individuals in our study, increased educational attainment led to increased occupational status. Therefore, this study supports the conclusion that earning a college degree is more important for occupational success than attending a prestigious college (Pascarella and Terenzini, 1991). Further, the regression results support socialization or human capital theory to the extent that college major and degree attainment resulted in the acquisition of skills necessary for occupational success.

These results have several practical implications. First, because degree completion is strongly related to occupational status attainment, administrators should examine ways to broaden access to higher education (for example, through financial aid incentives). Institutions should also explicitly recognize and attempt to deal with issues of student retention by providing a wide variety of support services (e.g., academic tutoring, counseling). Such initiatives are especially crucial given continuing changes in the enrollment patterns of groups not traditionally represented in higher education (e.g., women, minorities) or in particular fields of study (e.g., engineering).

In our study, occupational status remained relatively constant for most students seventeen and thirty-five years after high school, although the factors predicting occupational status appeared to change over time. Interestingly, the occupational status of respondents in 1974 was affected by the widest range of background, institutional, and educational variables. This suggests that personal and occupational factors may influence status attainment in different ways at different points in time, or that different factors (e.g., job training, professional achievements, seniority, number of job changes in the career, working in an area not related to college major) affect occupational status later in life. Because previous occupational status appears to have long-term effects, serious consideration should be given to providing students with adequate career counseling during college and perhaps prior to graduation from high school.

It is interesting that majoring in engineering or health contributed to higher occupational status both seventeen and thirty-five years after high school completion. Students majoring in science/math also ranked high in occupational status (Thomas and

Gordon, 1983), but only when examined seventeen years after high school. Admittedly, the labor market changed dramatically during the time period in which our study was conducted—rapid expansion in health care fields and within various industries possibly contributed to our findings, or perhaps majoring in certain subjects in college facilitated "networking" opportunities that were necessary for obtaining higher status occupations.

Another explanation is that skills learned in certain fields of study more closely fit with the skills required in a first job than did skills learned in other academic areas. For example, as an individual's career progressed, perhaps the specific skills that students learned in science/math declined in importance and were replaced by more general intellectual skills, or by an ability to learn on the job (Pascarella and Terenzini, 1991; Solmon, 1981). Yet another consideration is that typical categories of academic majors (humanities, social sciences, natural sciences, etc.) may provide inadequate measures of academic experiences in college. Future research should examine how multidimensional scaling of college majors could advance theory in this area (Pascarella and Terenzini, 1991; Wilson and Smith-Lovin, 1983). In addition, if adequate institutional policies and practices regarding mentoring, job placement, and career "networking" are to be made, more research will be needed to determine how occupational status outcomes are differentially affected by students' academic majors while in college.

We also found that student background characteristics such as gender, career aspirations, and academic ability had an impact on long-term occupational status attainments. In particular, the effects of gender and occupational aspirations on job status appeared to lessen over the life course rather than increase (Sewell, Hauser, and Wolf, 1980). While we found no evidence of the influence of family socioeconomic status on occupational attainment (Alexander and Eckland, 1975; Alwin, 1974; McClelland, 1986), job status was negatively affected by gender and positively affected by academic ability and occupational aspirations (Braxton, Brier, Herzog, and Pascarella, 1990; Ethington, Smart, and Pascarella, 1987; Jencks et al, 1979). However, the effect of these factors on status attainment appeared to differ for graduates when measured at two points in time following high school graduation. Further research is needed in order to clarify the nature of these relationships.

Given that college quality can be measured in many ways, studies of several dimensions of the occupational status attainment process should also be undertaken. In terms of possible avenues for future research, an expansion of the number and nature of college quality measures is in order. For example, institution-level measures of college quality could be expanded to include commitment to curricular reform/innovation, implementation of assessment policies and practices (e.g., measurement of student outcomes), documentation of faculty practices, and evaluation of the college climate

(institutional and departmental). The effects of such measures on student outcomes (e.g., occupational status) would be particularly informative given the impending shortages in certain academic fields (e.g., education, engineering).

Another particularly interesting way to examine college quality would be through an examination of learning outcomes that focus on student persistence levels, cognitive and psychosocial development, and both academic and social integration (e.g., faculty/student interaction levels, participation in extra-curricular activities). Such measures could help provide a more accurate picture of how postsecondary educational experiences impact student outcomes. Further, it is important that researchers specifically investigate how career-salient characteristics of students (values, attitudes, aspirations, college achievements) affect occupational outcomes as well as the extent to which job training affects long-term status attainments (Baird, 1985).

Conclusions

Existing theory suggests that background and institutional characteristics as well as educational attainments can influence the early occupational status of college students. However, the extent to which these factors remain predictive across extended periods of time following high school graduation has not been well understood. This study provides a preliminary examination of how such characteristics influence the occupational status attainments of students seventeen and thirty-five years after their completion of high school.

Endnotes

1. It has been noted that, while wages in the labor market admittedly vary according to job performance, they are also determined by the occupational status of the job (Knox, Lindsay, and Kolb, 1993).

2. Although the Siegel measure of occupational status was designed to provide prestige scorings for men only, research evidence suggests that men and women have a single occupational prestige hierarchy (Bose, 1973; Parnes, Shea, Spitz, and Zeller, 1970).

3. Such tests represent a range of competencies, partly innate and partly acquired, that contribute to success in school and in the workplace (Knox, Lindsay, and Kolb, 1993).

4. A number of studies have found that "overeducated" workers often receive a lower occupational return on investment in extra schooling than other workers (e.g., Rumberger, 1987; Tsang, 1987).

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Appendix

Table A. College Majors Recoded by Major Constructs

Major Construct	Survey Code #	College Major
Engineering	179	Aeronautics
	190	Aviation management
	056	Engineering, College of
	031	Engineering-chemical
	034	Engineering-civil and environmental
	054	Engineering-electrical and computer
	081	Engineering-industrial, industrial design
	095	Engineering-mechanical
	103	Engineering-metallurgical and mineral
Business	001	Accounting - Finance
	030	Business, School of (Business) (For "Business education" or Business and Teaching code Teaching)
Education	020	Art education
	044	Curriculum and instruction
	050	Education, School of, Teaching
	055	Elementary education
	109	Music education
	130	Physical education - men
	131	Physical education - women
	152	Secondary education
	042	Continuing and vocational education
Health	037	Communicative disorders, speech correction, speech therapy
	097	Medical microbiology
	099	Medical sciences
	100	Medical technology, X-ray technician (For non-college code 691)
	101	Medicine (MEDICINE plus one or more code 143 - Pre-medicine)
	114	Nursing, School of (For non-college use 564 or for practical nursing 601.)
	116	Occupational therapy
	119	Optometry
	126	Pharmacy
	128	Pharmacy, School of
	169	Physical therapy
	141	Pre-dentistry (DENTISTRY plus one or more, else code 047)
	143	Pre-medicine (MEDICINE plus one or more, else code 101)
	147	Radiology
	079	Health administration and hospital administration
	166	Veterinary science

continued

Table A continued

Major Construct	Survey Code #	College Major
Math/Science	023	Bacteriology
	025	Biochemistry
	026	Biology
	028	Botany
	032	Chemistry
	039	Computer sciences
	059	Entomology
	066	Geology and geophysics
	093	Mathematics
	104	Meteorology
	097	Microbiology
	132	Physics
	134	Physiology
	171	Science, nfs
	160	Statistics
	168	Zoology
Social Science	017	Anthropology
	049	Economics
	065	Geography
	176	International relations, diplomatic or foreign service
	138	Political science, government
	146	Psychology
	155	Social work
	156	Sociology
Humanities	035	Classics
	036	Communication arts, speech
	063	French
	072	History
	058	Humanities, English
	084	Italian
	087	Latin
	089	Letters and Science, College of
	090	Liberal studies, liberal arts (Liberal Arts)
	092	Linguistics
	129	Philosophy
	150	Russian
	159	Spanish
	164	Theology, ministers, priests (If PLNS58 does not equal 2-6, EDMJ57 was coded 712. This would include many religious schools.)

continued

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Table A continued

Major Construct	Survey Code #	College Major
Other	004	Agricultural and extension education
	005	Agricultural and life sciences, College of
	006	Agricultural economics
	007	Agricultural engineering
	010	Agronomy
	012	Air, military, and naval science
	013	American institutions
	094	Animal and meat science
	016	Animal husbandry
	018	Architecture
	019	Art, Department of
	024	Behavioral disabilities
	040	Conservation
	045	Dairy science
	060	Family resources and consumer sciences, School of
	172	Fine Arts
	061	Food science
	062	Forestry
	076	Home economics education and extension
	077	Home management and family living (Home Economics)
	078	Horticulture
	080	Industrial education, industrial arts
	081	Industrial engineering, industrial design
	082	Industrial relations
	148	Interior decorating, related art
	085	Journalism and mass communication
	086	Landscape architecture
	088	Law, School of (LAW plus one or more code 142 - Pre-Law)
	091	Library science
	105	Military science
	108	Music - performing
	107	Music, nfs
	110	Naval science
	142	Pre-law (LAW plus one or more, else code 088)
	157	Soil science
	162	Textiles, clothing, fashion
	163	Theater, drama, acting
	165	Urban and regional planning

Note: 300-733 = Non-college majors coded as "missing."